Systematics of *Grania* (Clitellata: Enchytraeidae), an interstitial annelid taxon

Pierre De Wit

UNIVERSITY OF GOTHENBURG

Faculty of Science, Department of Zoology

Akademisk avhandling för filosofie doktorsexamen i Biologi med inriktning mot systematik och biodiversitet, som kommer att offentligt försvaras fredagen den 5:e Mars 2010, klockan 10:00 i Föreläsningssalen, Zoologiska Institutionen, Medicinaregatan 18, 413 90 Göteborg. Examinator: Per Sundberg. Opponent: Dr. Adrian Glover, Zoology Department, Natural History Museum, Cromwell Road, London, United Kingdom SW7 5BD

ISBN 978-91-628-8012-5

Dissertation abstract

Pierre De Wit (2010). Systematics of Grania (Clitellata: Enchytraeidae), an interstitial annelid taxon.
University of Gothenburg, Department of Zoology, PO Box 463, SE-405 30 Göteborg, Sweden.

In between the grains of sand on the ocean floor, there exists a world which few people are aware of. Representatives of almost all animal phyla can be found here. The clitellate family Enchytraeidae is in the marine interstitial environment represented in large part by species of a genus called *Grania*, which are long slender worms found in marine sands throughout the world. This thesis is a study on the systematics of these worms. The body wall of *Grania* is searched for phylogenetically informative morphological characters. It is found that the cuticular morphological variation seen in naidids is absent, but the collagen fiber thickness varies between *Grania* species. Also, the circular and outer, triangular longitudinal musculature is reduced compared to that of closely related taxa while the inner, ribbon-shaped longitudinal muscle fibers are well-developed, possibly an adaptation to interstitial life. The *Grania*-fauna of the Great Barrier Reef is investigated, with four new species described and *Grania trichaeta* re-described. The phylogenetic position of *Grania* within the family Enchytraeidae is elucidated by molecular means, where *Lumbricillus arenarius* is shown to be a close relative of a monophyletic *Grania*. Within the genus, a molecular phylogeny is inferred of a sample of 19 species, showing considerable morphological homoplasy, while geographical distribution is concordant with the phylogeny. Thus, we combine morphology with geography, while using the DNA-based tree as a backbone constraint, to estimate a phylogeny of all 71 currently described species within the genus. Finally, the genetic variation within Scandinavian species of *Grania* is studied with the resulting find of a cryptic species, and the realization that although intraspecific variation generally is low, deviant individuals exist. Within this study, we also infer a phylogeny of the Scandinavian species of *Grania*, which seems to be a monophyletic group, and discuss their morphological character evolution.

Keywords: Clitellata, Oligochaeta, Enchytraeidae, *Grania*, interstitial habitat, systematics, phylogeny, DNA barcoding, cryptic species

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